

REMARKS

In view of the following remarks, reconsideration of the rejections and further examination are requested. Claims 1 and 3-19 are pending with claims 1 and 5 being independent.

Allowable Subject Matter

Applicants appreciate the indication that claim 5 is allowed.

Additionally, Applicant assumes claim 4 contains allowable subject matter, since the Examiner has not set forth any substantive rejection of claim 4.

Rejections Under 35 U.S.C. §103(a)

Claims 1, 3, 6, 7, 9-11 and 15-19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Shimizu (JP 11-233889).

Applicants respectfully traverse this rejection. Specifically, independent claim 1 recites a surface emitting laser for performing surface emission of laser light, wherein one of a pair of electrodes comprises a single electrode layer in contact with a semiconductor layer laminated body defining a contact area, the contact area having a center portion and a peripheral portion at least partially surrounding the center portion, the peripheral portion having an outer periphery and an area density that continuously decreases from the center portion to the outer periphery, such that the one electrode is configured to inject current into an active layer, such that the current densities for the center portion and the peripheral portion are different.

Such a surface emitting laser is distinct from the cited prior art in object, construction, and effect. Moreover, as described in page 25, line 12 to page 26, line 12 of the specification of this application, the present invention solves the following problems of the prior art surface emitting lasers:

- i) loss occurring in the injection of current into the active layer due to the resistive separation layer located in the part where the electrode is divided, resulting in reduced efficiency;
- ii) matching between the injection carrier density distribution and the light intensity distribution being insufficient, since the injection carrier density distribution is only changed discretely; and
- iii) the laser driving circuit being undesirably complicated, since the laser driving voltage

is applied to a plurality of divided electrodes.

Applicants submit that the cited prior art fails to disclose or render obvious the recited structure or advantages of the invention recited in independent claim 1. In particular, the Examiner contends that Shimizu renders claim 1 obvious, since "it would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the decreasing area density of Shimizu to a continuously decreasing area density as a matter of engineering design choice not materially effecting the current injection profile of Shimizu", based on the description of paragraph [0034] of Shimizu.

Applicants respectfully disagree and submit that, while Shimizu arguably discloses in paragraph [0034] that the shapes of the divided electrodes 16 (lower electrodes) can be arbitrarily selected, the lower electrode is divided into a plurality of electrodes and the voltages to be applied to the respective divided electrodes are individually adjusted to adjust the distribution of the injection carrier density. Thus, paragraph [0034] of Shimizu only discloses that the shapes of the respective divided electrodes can be arbitrarily selected, but this paragraph does not disclose a single-shape electrode having a configuration in which the area density at a contact surface between a lower electrode and a semiconductor layer laminated body continuously decreases from its center portion toward its peripheral portion, as recited in claim 1.

Additionally, there is no reasoning in the prior art to modify Shimizu such that it would have rendered independent claim 1 obvious. Any such reasoning is improper hindsight. Therefore, Applicants submit that independent claim 1 and its dependent claims are allowable over the cited prior art.

Claim 8 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Shimizu in view of Marta et al. (U.S. 5,745,515). Additionally, claims 12 and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shimizu in view of Mooradian (WO 98/43329). Furthermore, claim 13 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Shimizu in view of Iga et al. (JP 02-052485).

Since each of these claims is dependent from claim 1 and since Marta, Mooradian, and Iga each fail to overcome the deficiencies of Shimizu, claims 8, 12, 13, and 14 are allowable for the reasons set forth above.

Conclusion

In view of the foregoing amendments and remarks, all of the claims now pending in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Should the Examiner believe there are any remaining issues that must be resolved before this application can be allowed, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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